

# Effect of Topic on the Arabic Language Used on Social Networks and Mobile Phone Communications

Mohammed Zeki Khedher, Gheith A. Abandah  
The University of Jordan  
Amman, Jordan  
khedher@ju.edu.jo, abandah@ju.edu.jo

Sami M. Ababneh, Ahmad A. Zghoul  
The University of Jordan  
Amman, Jordan  
sami\_ababneh@hotmail.com, a.zghoul@ju.edu.jo

Waleed A. Al-Anati  
Qatar University  
Doha, Qatar  
anati\_waleed@hotmail.com

Mamoun S. Hattab  
Arabic Textware  
Amman, Jordan  
m.hattab@arabtext.ws

**Abstract**—This paper focuses on the effects of topic on the Arabic language used in Facebook, Twitter, news sites, blogging sites, and mobile phone messaging. The results presented in this paper are based on a comprehensive study that was carried out using 8,538 text samples from these five forums. The sample topics are categorized into nine categories: political, social, economic, academic, religious, scientific, sports, arts, and others. The effect of topic is analyzed on several Arabic language aspects including the language whether Arabic, English, or mixed; the alphabet whether Arabic, English, or Arabizi; the dialect whether standard, colloquial, or mixed; the use of symbols; the style whether normal, metaphor, cynical, vulgar, or other; and the text cohesion level. This paper shows that there are large differences found in these six language aspects among the nine topic categories. Most notably, standard and refined language is common in serious topics such as religion and politics. Colloquial Arabic dialect and weak cohesion with Arabizi alphabet is common in casual topics such as social and academic topics.

**Keywords**—Arabic language; Jordan; social networks; short messages; linguistic variation

## I. INTRODUCTION

The internet, social networks, mobile phones, and smartphone penetrations are increasing year after year globally [1-3]. The Arab World and Jordan are no exceptions. More and more people are accessing the internet and social networks through their computers and smartphones. In 2014, Jordan has reached internet and mobile phone penetrations of 74 and 147%, respectively [4]. Many Jordanians are actively communicating through social networks and mobile phones. The penetration of famous social networks in Jordan such as Facebook, LinkedIn, and Twitter has reached 47.9, 5.0, and

2.4%, respectively [5]. In fact, Facebook is the top internet site visited in Jordan [2] and Jordanians send more than 11 million tweets monthly and have exchanged over 2.5 billion short messages last year [4]. These rates are expected to continue rising due to the rising smartphone penetration and the increasing popularity of free messaging services such as WhatsApp, Skype, and Viber.

There are also many indicators that the number and percentage of internet contributions in the Arabic language through these forums in the Arab World are increasing [5]. However, there are concerns about the quality and type of the Arabic language used in these forums and how the internet affects the language and vice versa [6]. Moreover, the quality and type of this language depend on the forum where it is used and the topic that it addresses [21, 22].

The study of the relation between the topic and the type or level of language used is very old. For example, al-Jahiz (d. 869) discussed in his book *Kitab al-Bayan wa al-Tabyin* some issues related to the suitable language style according to the topic [7]. Al-Jahiz noted that telling jokes in the colloquial Arabic dialect is often more suitable than the formal (*Fusha*) dialect; telling a joke in *Fusha* often loses its humor.

In modern linguistics, Ferguson described that societies often demonstrate *Diglossia* of languages, in which one of the languages has high prestige, and another has low prestige that are closely related [8]. In sociolinguistics, the *linguistic variation theory* states that the language often has large variations due to many factors that affect its vocabulary, structure, and style [9]. The topic is one of the important factors that cause these variations.

There are several studies that have tackled the subjects of the Arabic language on the internet and mobile phone messaging in several Arabic countries [10-13, 23]. Al-Obaid has studied the effect of Twitter on the users' Arabic language used in Saudi Arabia [21]. She noted that the Fusha ratio ranges from 5 to 100% according to the topic of the Twitter account. Al-Sabaan studied the linguistic styles used in email messages by Arab youth [22]. She noted that there are large variations in the alphabets and dialects used.

We have performed a comprehensive study of the status of the Arabic language that Jordanians use in social networks and mobile phone communications. The main objectives of this study are to find the characteristics of the Arabic language used and to identify the main problems in the quality of the language used. Hopefully, this identification would lead to solutions to improve the quality and effectiveness of Arabic language communications in these forums.

This study incorporated Jakobson's effective communication model, including the sender, context, message, channel, code, and the receiver [14]. We collected many text samples and information about their sender, context, and channel from five sources. The five sources are Facebook, Twitter, News sites comments, blogging sites, and mobile phone messaging. To facilitate studying the topic effect, the topic of each sample was categorized into nine categories: political, social, economic, academic, religious, scientific, sports, arts, and others.

This study is more comprehensive than previous work in studying these issues in Jordan by collecting large sample from five sources and analyzing this sample on many aspects as detailed below. The details of this study are published in a book [24]. In a previous paper, we have presented the aspects of this study related to the used language, alphabet, dialect, text components, and style as a function of the five sources [15].

This paper summarizes the methodology used in collecting fair and representative sample and analyzing this sample. It mainly concentrates on the analysis results related to the topic of the collected samples. We present here the effect of topic on the used language, alphabet, dialect, text components, style, and text cohesion level.

Section II summarizes the methodology used including the developed sample collection and analysis application and the sample collection methods from the five study sources. Section III presents the results of the used language, alphabet, dialect, text components, style, and cohesion level according to the topic. Finally, Section IV summarizes the main results.

## II. METODOLOGY

In this section, we introduce the methodology used in this study. We describe the application developed to collect and analyze samples. We also describe how samples were collected from the five study sources.

### A. Sample Collection and Analysis Application

We have developed a web-based application to facilitate and speed up the processes of sample collection and analysis. This application supports two main roles: sample *collector* and

sample *analyzer*. The main page used in sample collection allows the collector to specify the sample text and its main attributes such as the topic, URL, source, and author type.

The main page used by the sample analyzer to analyze the lingual characteristics of the collected samples shows the sample text, URL, and number of words. The analyzer analyzes the sample text and uses nine hyperlinks in this page to enter the analysis for the shown sample.

These nine hyperlinks allow the analyzer to access nine subpages to enter the following analysis information.

- 1) Language information (detailed below)
- 2) Foreign words present in the text
- 3) Common words used in the text
- 4) Idiomatic expressions used in the text
- 5) Foreign prefixes and suffixes
- 6) Hybrid Arabic/English words
- 7) Abbreviations
- 8) Language quality including text cohesion level and spelling, lexical, morphological, and grammatical errors
- 9) Morphological features

The first subpage, the *language information subpage*, allows the analyzer to specify the following five characteristics.

- 1) Language: Arabic, English, or mixed
- 2) Alphabet: Arabic, English, or Arabizi
- 3) Dialect: standard, colloquial, or mixed
- 4) Text components: letters only or letters and symbols used in suggestive writing such as smileys :) and long laugh ^^^^^^^^^^ .
- 5) Style: normal, metaphor, cynical, vulgar, or other.

This paper concentrates on the analysis results of this subpage and the text cohesion level (of Subpage 8) according to the topic. More detail about these characteristics is in Section III.

### B. Sample Collection Method

We have collected many samples from the five study sources. The collection method aimed at collecting a fair and representative sample. The following subsections describe how this sample was collected from the five study sources.

#### 1) Facebook

Facebook is the top visited Internet site in Jordan [2]. Facebook allows its users to update their statuses, upload photos or videos, post on the walls of other users, and share and comment on almost anything posted by other users. We have collected samples of the text of the Facebook contributions: status update, photo or video upload description, posting on other's wall, added text of a shared contribution, and comment on any of the previous contributions.

These contributions are usually related to three sources: a *user* account, a *group* of users, or a *page* of some organization, product, etc. We have collected 2,507 samples of the above contributions as detailed in Table I. For more information about collecting these samples, refer to Ref. [15, 24].

TABLE I. FACEBOOK SAMPLES BY SOURCE

| Facebook Source | Count     | Number of Samples |
|-----------------|-----------|-------------------|
| User accounts   | 100 users | 986               |
| Groups          | 27 groups | 752               |
| Pages           | 7 pages   | 769               |
| <b>Total</b>    |           | <b>2,507</b>      |

### 2) Twitter

Twitter is the second most popular social networking site in Jordan [2]. Users in Twitter contribute by sending *tweets*. Each tweet is limited to 140 characters and users view the tweets of the users they *follow*. We have collected the information of 1,514 tweets using Twitter’s *advanced search* feature. In order to collect fair and representative sample, we collected the samples that satisfy the following criteria.

- Original tweet, not retweet
- The twitter is a person, not an organization
- The twitter’s country is Jordan
- The tweet’s language is Arabic, English, or mixed

Moreover, the sample collection process extended from Jul 18, 2013 to Sep 4, 2013 over all week and day times.

### 3) News Sites Comments

There are more than 118 electronic press sites in Jordan [25]. Most of these sites allow the visitors to comment on the posted news. For some sites, these comments reach hundreds of comments for some popular news items.

We have collected 1,504 samples of these comments over a two-month period over all week and day times. We collected samples from various news topics including politics, economics, sports, society, arts, and culture. The sites from where these samples were collected are the sites that are most visited in Jordan [2] and allow visitor comments. The sites that we have collected samples from are Jfra News, Khaberni, Ammon News, Alghad Newspaper, Assabeel, and Tasweer News.

### 4) Blogs

Bloggging became popular in Jordan more than 10 years ago. Many bloggers use their blogging sites to express their views, ideas, and feelings. Many specialists think that some blogging sites such as the *Black Iris* have contributed in raising the ceiling of freedoms in Jordan [16]. However, traditional bloggging is in decline as more and more bloggers are expressing themselves through Facebook and Twitter. Moreover, many Jordanian blogs are in English and reach selected segment of the Jordanian population.

Most bloggging sites allow visitors to comment on the posted blogs. We have collected 52 original blogs from 52 blog

sites and 459 comments on these blogs. These blogs come mainly from the most popular Jordanian blog sites according to *Jordan Blogs* and *Best Jordanian Bogs* [17, 18]. The details of these blogs are in [24].

### 5) Short Messages

Users of mobile phones often communicate through sending short text messages to each other. Recently, many smartphone users send such messages free of charge through specialized services such as WhatsApp, Skype, and Viber. As these messages are private from the sender to the receiver(s), we cannot collect samples of them through some open source venue. Therefore, we invited volunteers to give us samples they received on their mobile phones. To improve the fairness and representativeness of these samples, we asked each volunteer to submit 5-25 message samples that satisfy the following criteria.

- Arabic message or mixed (Arabic and English)
- Randomly selected without restriction on the message topic
- Not from some organization or some advertisement, but must be from a person

We have collected 2,502 from 141 volunteers most of them are male and female students from Jordanian universities. However, as the volunteers provided the messages they have received (not sent), the sample represents a larger segment of the Jordanian population.

## III. RESULTS

In this section, we present the topic effect analysis of this study. The following subsections present the topic effects on the used language, alphabet, dialect, components, style, and cohesion on the five study sources. We also comment on these results and provide some explanations.

Figure 1 shows the statistics of the samples according to their topics. It shows that social and other topics have highest percentages in Facebook (26.7% and 40.2%). The political topic has the highest percentages in Twitter and News at 31.3 and 83.7%, respectively. The political and social topics are almost equally popular in Blogs at 32.0 and 31.0%, respectively. More than three quarters of the samples of Messages are of social topic. Generally, the social topic has the highest average percentage (37.1%) followed by the political topic (25.4%). The rest of the topics are below the 6% level. The social topic is the top topic in Facebook and Messages and the political topic is the top topic in Twitter, News, and Blogs.

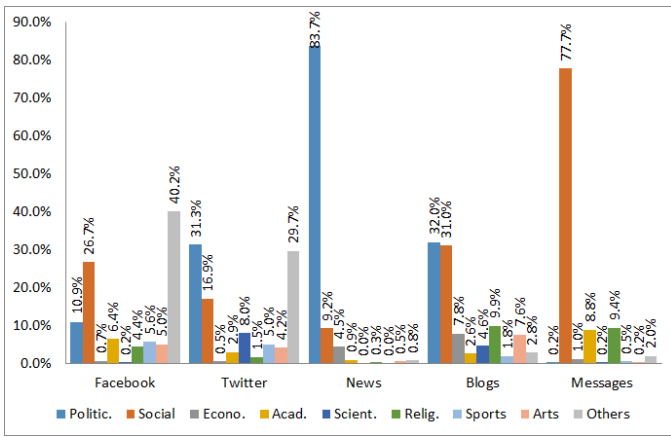


Fig. 1. Sample distributions according to the five sources and nine topics

### A. Language

The language of the text Jordanians use in the five study sources is Arabic, English, or mixed Arabic and English. This study concentrated on the samples that use either Arabic or mixed language. However, we have counted the number of samples encountered in this study that use pure English. In Facebook and Twitter, 14 and 24% of the users' contributions are in English, respectively. This means that Jordanians use mainly the Arabic language in their social networks communication. However, a significant fraction of their tweets is in English.

Figure 2 shows the distribution of samples that are not in English. The figure also shows the average of the distribution of the nine topics. This figure shows that the majority of text used in all topics is in pure Arabic without any English words or phrases. However, 9.3% of academic topics use mixed text. This percentage in social topics is 5.5% and less than this in the other topics. The relatively high percentage of mixed language in the academic topic indicates a weakness in finding proper Arabic terms in place of the English terms used. This weakness is also present in the social topics and less clear in other topics.

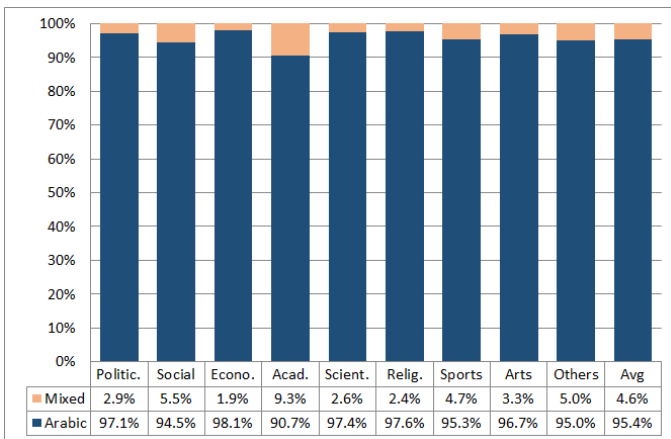


Fig. 2. Language used: Arabic or Arabic with some English words.

### B. Alphabet

Arabic is usually written using its alphabet that has 28 basic letters [19]. However, due to technical issues, some writers write Arabic using English letters. Currently, many people write Arabic using English letters and numerals. This writing style is called *Arabizi* [20]. Basically, The Arabic letters that have English counterparts are written using their English counterparts, e.g., 's' for Arabic **Seen** (س) and 'b' for **Beh** (ب). The rest Arabic letters are written using English letter combinations, e.g., 'th' for **Thal** (ث) and 'sh' for **Sheen** (ش), or using numerals that are closest to them in shape, e.g., '3' for **Ain** (ع) and '7' for **Hah** (ح).

Figure 3 shows the use of the two alphabets for the nine topics. The majority of text is written in the Arabic alphabet in all topics. However, there are significant percentages of samples in Arabizi, especially in the social (24.6%) and academic (24.8%) topics. The rest of topics have Arabizi percentages of less than 8%. The use of Arabizi can be considered a phenomenon of a technical problem due to the ease of entering English letters on portable devices compared with Arabic letters. This use has also a historical economic reason as it is more expensive to send Arabic letters (16-bit code) through SMS messages compared with English letters (7-bit code).

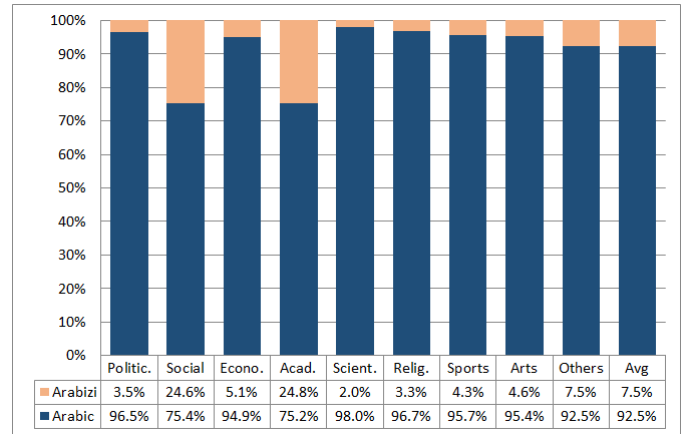


Fig. 3. Alphabet used: Arabic or Arabizi according to the topic.

### C. Dialect

Figure 4 shows the distributions of the samples according to the dialect used. On average, more than one half the samples (55.4%) are using the colloquial Jordanian Arabic, above one third (36.4%) use the standard Arabic, and the rest (8.2%) use the standard Arabic with some colloquial words. This indicates that Jordanians, in general, prefer to use the colloquial Jordanian Arabic and the mixed dialect. Social topics usually use colloquial dialect (72.2%). Many users use Arabizi in social topics as well. For academic topics, the percentage is close to the social topic (69.3%) as students usually exchange academic discussions and ideas in the colloquial dialect.

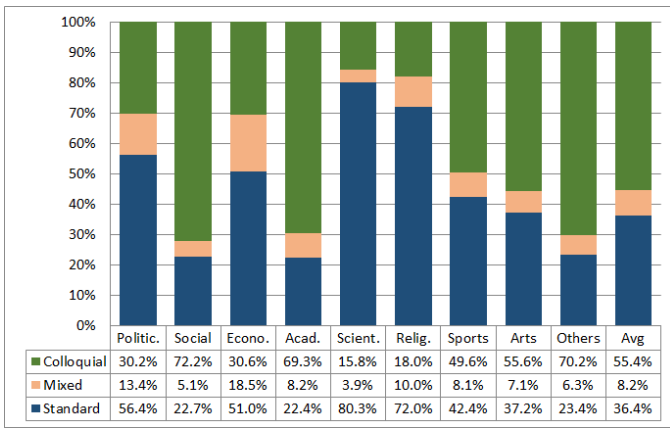


Fig. 4. Dialect used: Standard Arabic, mixed standard and colloquial, or colloquial Arabic.

The scientific topic has the lowest colloquial percentage (15.8%), next is the religious topic (18.0%), while political (30.2%) and economic topics (30.6%) are midway. Sports (49.6%) and arts (55.6%) have about half of the samples in the colloquial dialect. Moreover, economic and political topics have the highest percentages of mixed dialect at 18.5 and 13.4%, respectively.

The relatively high percentages of the standard and mixed dialect in the political, scientific, and religion topics reflect that the people involved in these topics generally prefer using standard Arabic. However, they often resort to inserting some colloquial words that they feel will enhance conveying their ideas and feelings.

#### D. Text Components

Figure 5 shows that an average of 79.2% of the samples uses standard letters and characters and 20.8% additionally uses special symbols and suggestive visual writing.

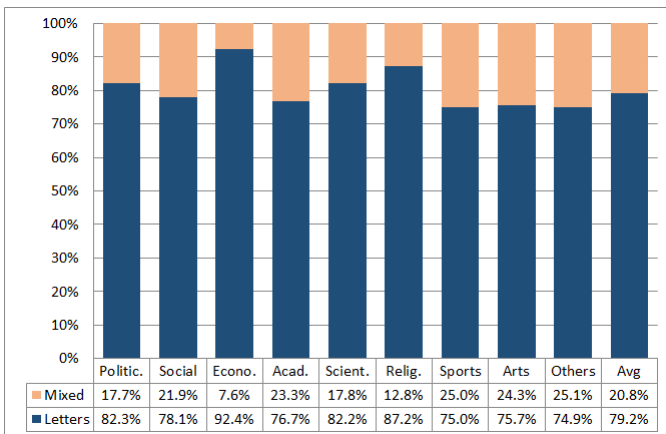


Fig. 5. Text components used: Letters or letters and symbols.

The mixed writing makes 25.0% in sports, 24.3% in arts, 23.3% in academic, 21.9% in social, 17.8% in scientific, 17.7% in political topics. This mixed writing is least used in the economic (7.6%) and religious (12.8%) topics. Statistical analysis has shown clear relationship between topic and use of the mixed writing. It is clear that the sports, arts, academic, and

social topics have relatively high percentages of this mixed writing.

This mixed writing includes using special character sequences to express feelings such as :) for happy face, :( for sad face, and <3 for love heart. Some sites, like Facebook, automatically convert such sequences to nice images like ☺, ☹, and ♥. Moreover, some applications, like WhatsApp, have special menus and keyboard layouts to facilitate entering these popular drawings. This mixed writing also includes repeating some letters to give some suggestive expression such as هههههههه for long laugh, خخخ for cynical laugh, and ممم for wonder.

This mixed writing allows the users to express their feelings efficiently with small number of characters. For example, instead of writing “I feel happy” one can enter :) . This mixed writing is not usually used in traditional writing and in books and newspapers and its use in social networks is a new phenomenon. The obvious reason for this is its effective and concentrated way of transmitting feelings with least number of key strokes.

#### E. Language Style

Figure 6 shows the distributions of the samples according to the rhetorical style used. On average, 82.6% of the samples use the normal or plain style. This is expected as most of these samples are related to direct day-to-day communications.

The metaphor style is the highest in scientific (11.2%) and arts (12.1%) topics. However, on average, it is only 4.7%. The cynical style is higher than this as it has an average of 9.4% and is highest in sports (13.6%) and other (17.6%) topics. As for the vulgar style, the average percentage is very low (1.9%) and is relatively high in arts (6.3%) and sports (5.5%) topics. This indicates that the big majority of samples are in polite styles and the use of the vulgar style is rare except in arts and sports. The use of the metaphor style in scientific and arts topics is probably an indication of higher education of those engaged in these two topics. However, this needs further investigations to prove.

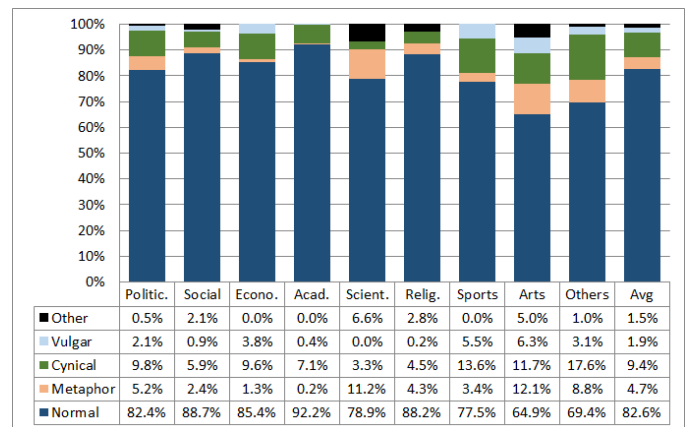


Fig. 6. Language style: normal, metaphor, cynical, vulgar, or other.

#### F. Cohesion

Figure 7 shows the text distribution according to the topic and their level of cohesion. Cohesion is rated in five levels

(excellent, very good, good, acceptable, and weak). The figure shows that the scientific topic has the highest excellent level (70.4%) followed by the religious topic (53.6%). The political and arts topics come next with 30.0 and 28.9%, respectively. The topics that have lowest excellent level are social (10.8%), academic (14.7%), and sports (18.2%).

The weak cohesion level is highest in the social topic (69.1%) followed by academic (63.8%), others (55.7%), arts (43.9%), sports (39.0%), and economic (32.5%). The smallest percentage of the weak level is in the scientific topic (2.0%) followed by the religious (17.5%) and political (21.3%) topics. It seems that there is a good relationship between text cohesion and the topic seriousness. The topics that are important and serious have better and more cohesive language such as the scientific, religious, and political topics. This indicates that the participants in scientific, religious, and political topics have higher levels Arabic language mastery.

#### IV. DISCUSSION AND CONCLUSIONS

The amount of data analyzed for the nine categories under study was quite enough for valid statistical purposes. This paper is concerned with the effect of topic on various characteristics of the Arabic language used in social networks and mobile phones. The following are main concluded remarks:

Most of the samples from the News source are of the political topic, while mobile messages are mostly of the social topic. In general, the social networks and messages contents are biased to the social topic. Although Jordanians mostly use the Arabic language in studied forums, the use of the English language in Twitter is not negligible.

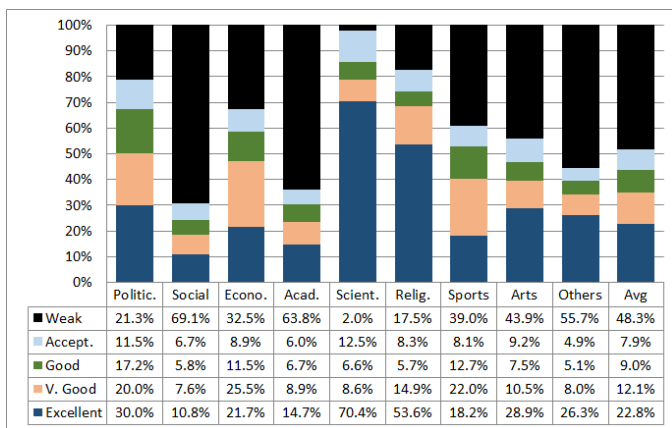


Fig. 7. Cohesion level: Excellent, very good, good, acceptable, and weak.

The mixed Arabic with some English words percentage in the academic topic draws the attention to the weakness in finding proper terms in Arabic to replace the English terms used. This weakness is also present in the social topic. The relatively high percentage of Arabizi in the social and academic topics can be attributed to social, technical, and political reasons. For example, it is often easier and cheaper to enter and exchange Arabic letters compared with English letters.

As Jordanians mainly use their colloquial Arabic in their casual daily interactions, this familiarity is reflected in high

percentages of the Colloquial and Mixed dialects, especially in the social, academic, others, arts, and sports topics. However, the religious, scientific, and political topics have higher percentages of the Standard Arabic.

In general, the use of special symbols and suggestive visual writing, which is not common in the traditional writing, books, and newspapers, is strongly present in social networks and mobile messages. The obvious reason for this is its effectiveness in conveying intentions and feelings with few key strokes.

The big majority of samples in this research use the normal style. The use of the vulgar style is rare except in arts and sports. The use of the metaphor style in the scientific and arts topics is probably an indication of higher education of the people involved. Finally, the presented statistical evidence implies that participants in the scientific, religious, and political topics show higher levels Arabic language mastery.

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